Cloud Networks

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E.Abarca, J.Grassler
T-Labs, FG INET
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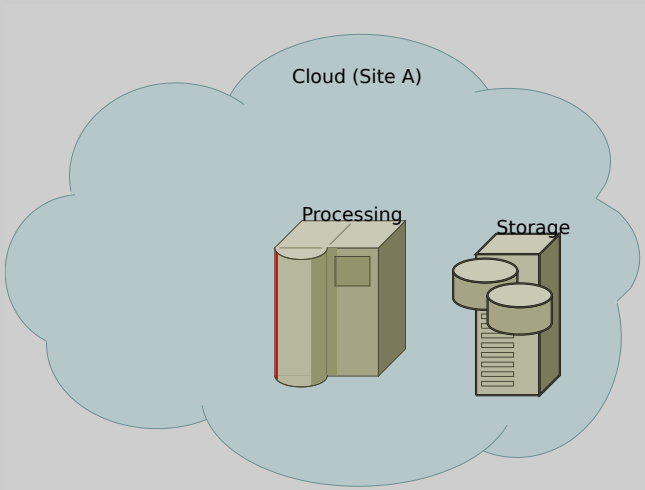
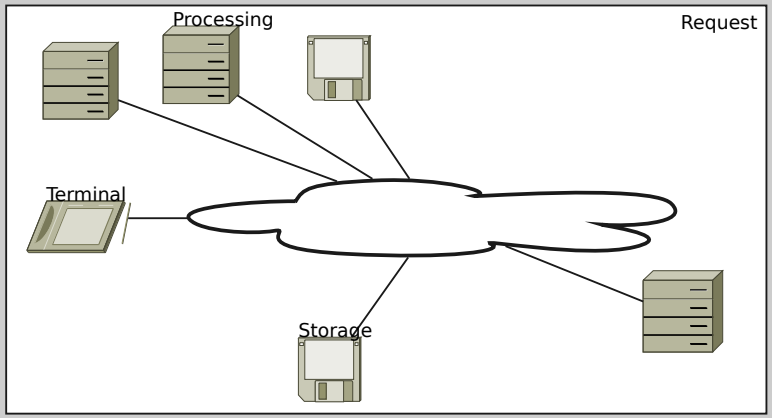
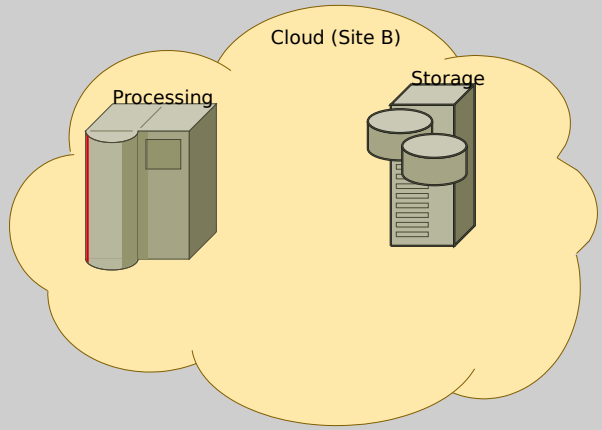
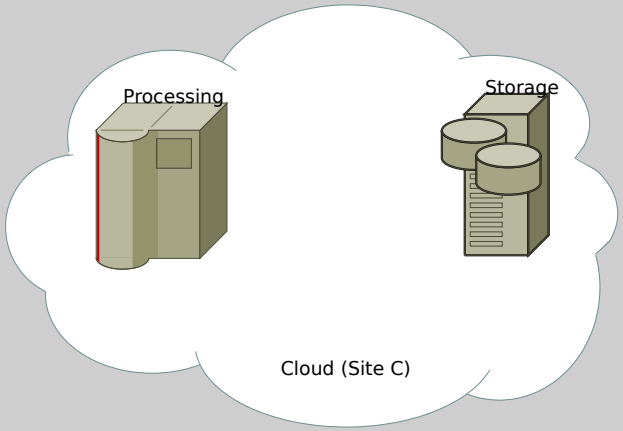
April 25, 2012

CloudNets

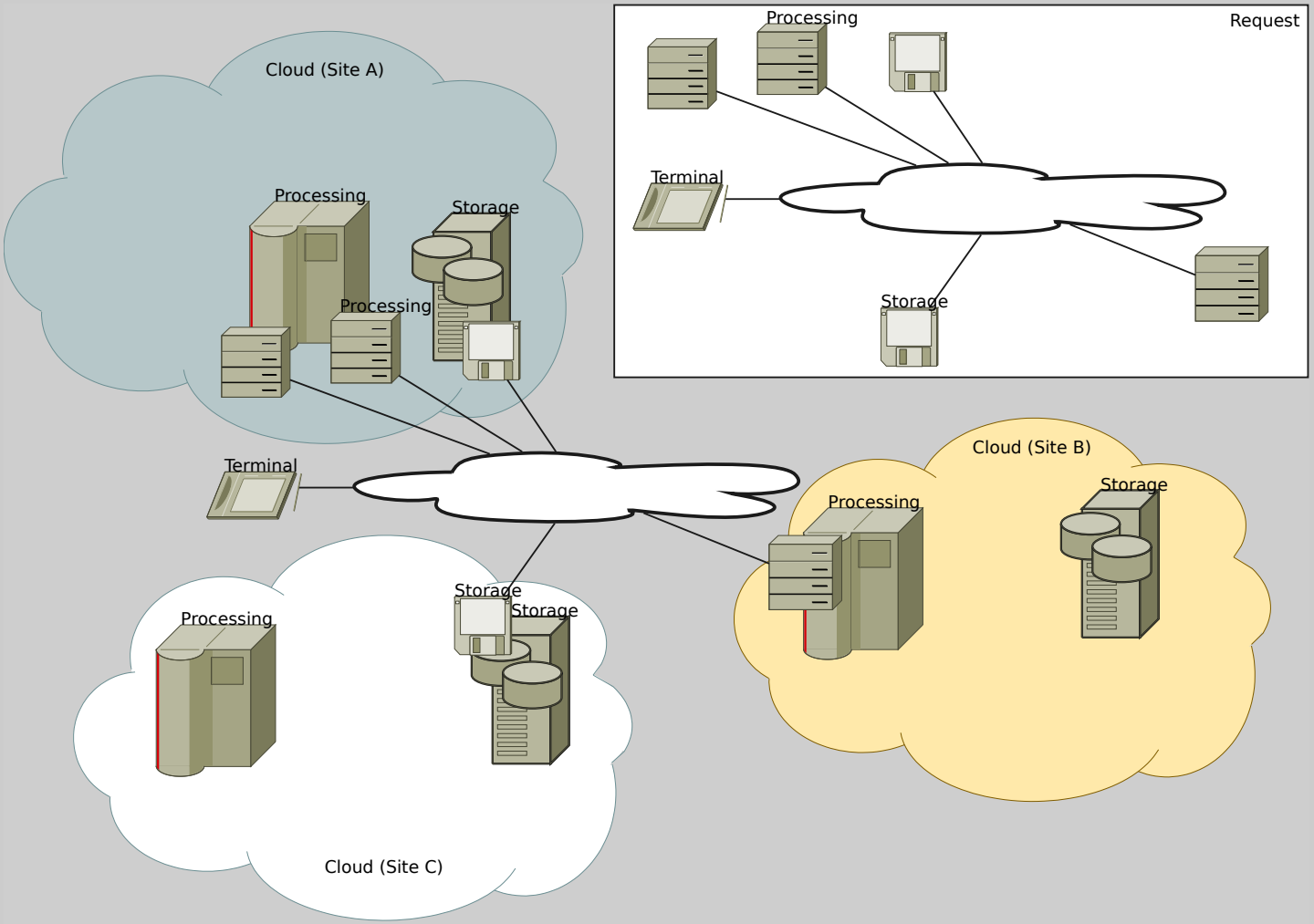

Cloud (Site A)
Processing
Storage


Processing
Request
Terminal
Storage

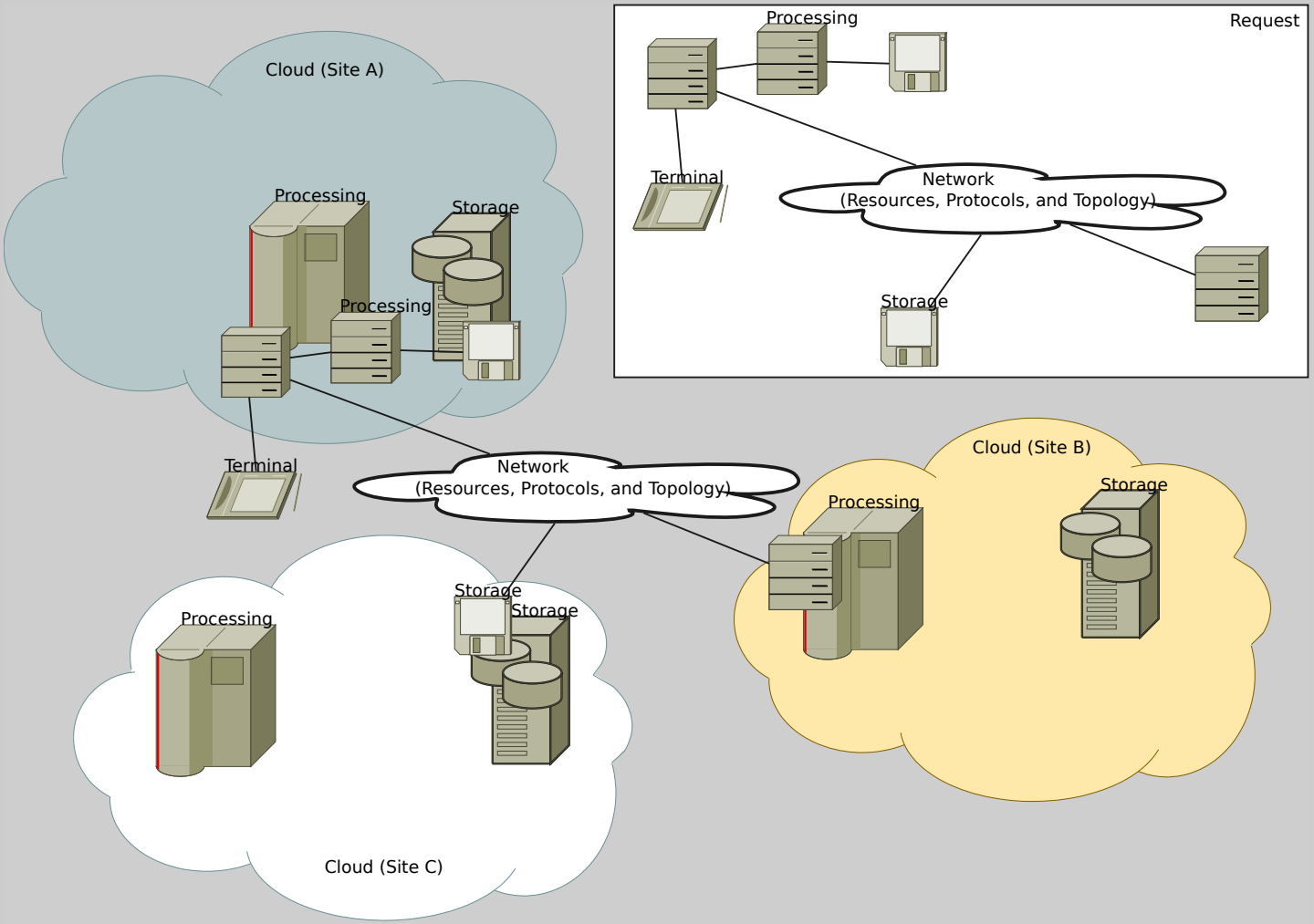

Cloud (Site B)
Processing
Storage


Processing
Storage
Cloud (Site C)

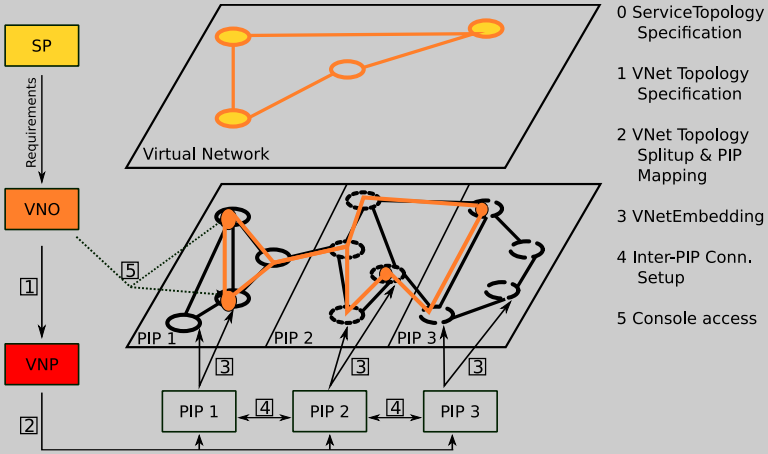
CloudNets


Cloud (Site A)
Processing
Storage
Processing
Terminal
Processing
Request
Terminal
Storage
Cloud (Site B)
Storage
Processing
Storage
Processing
Storage
Cloud (Site C)

CloudNets

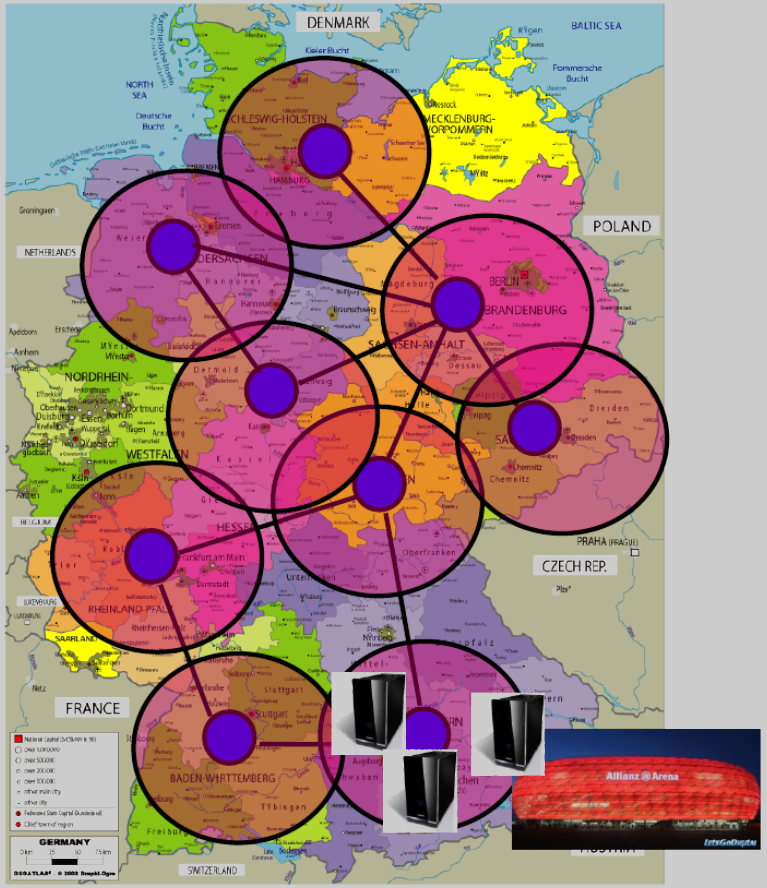

Cloud (Site A)
Processing
Storage
Processing
Terminal
Network
(Resources, Protocols, and Topology)
Cloud (Site B)
Processing
Storage
Storage
Processing
Storage
Cloud (Site C)
Request
Processing
Terminal
Network
(Resources, Protocols, and Topology)
Storage

Topics

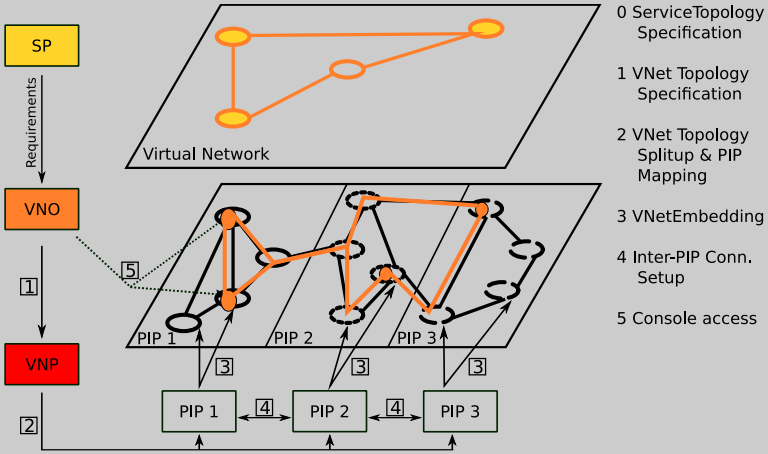


CloudNet Management

- Framework
- Resource Mapping
- Migration Mgmt.
- Resource Description

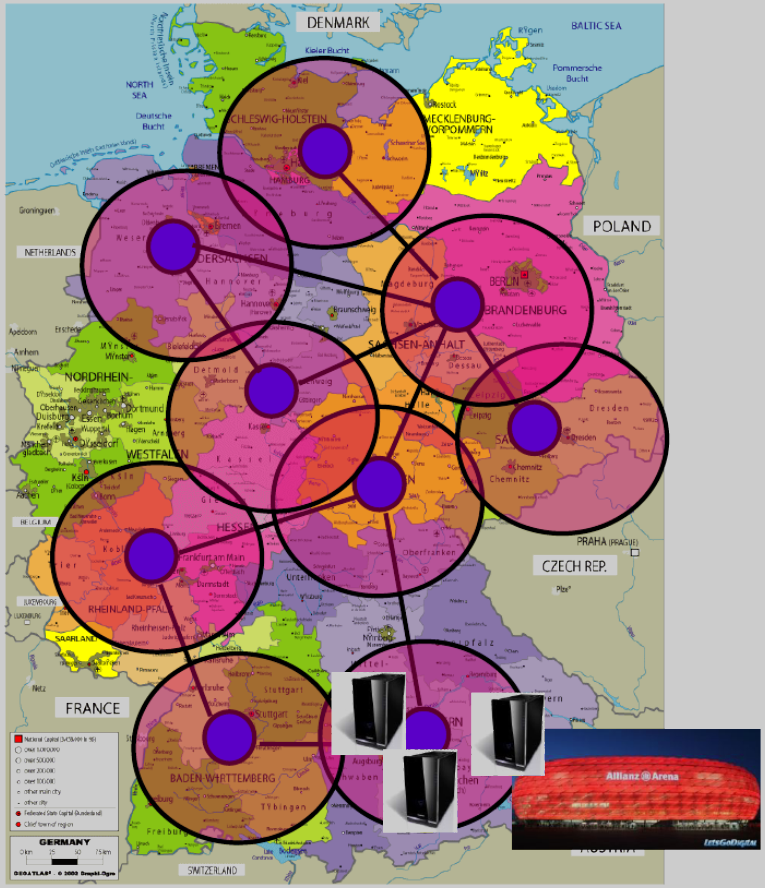


Topics

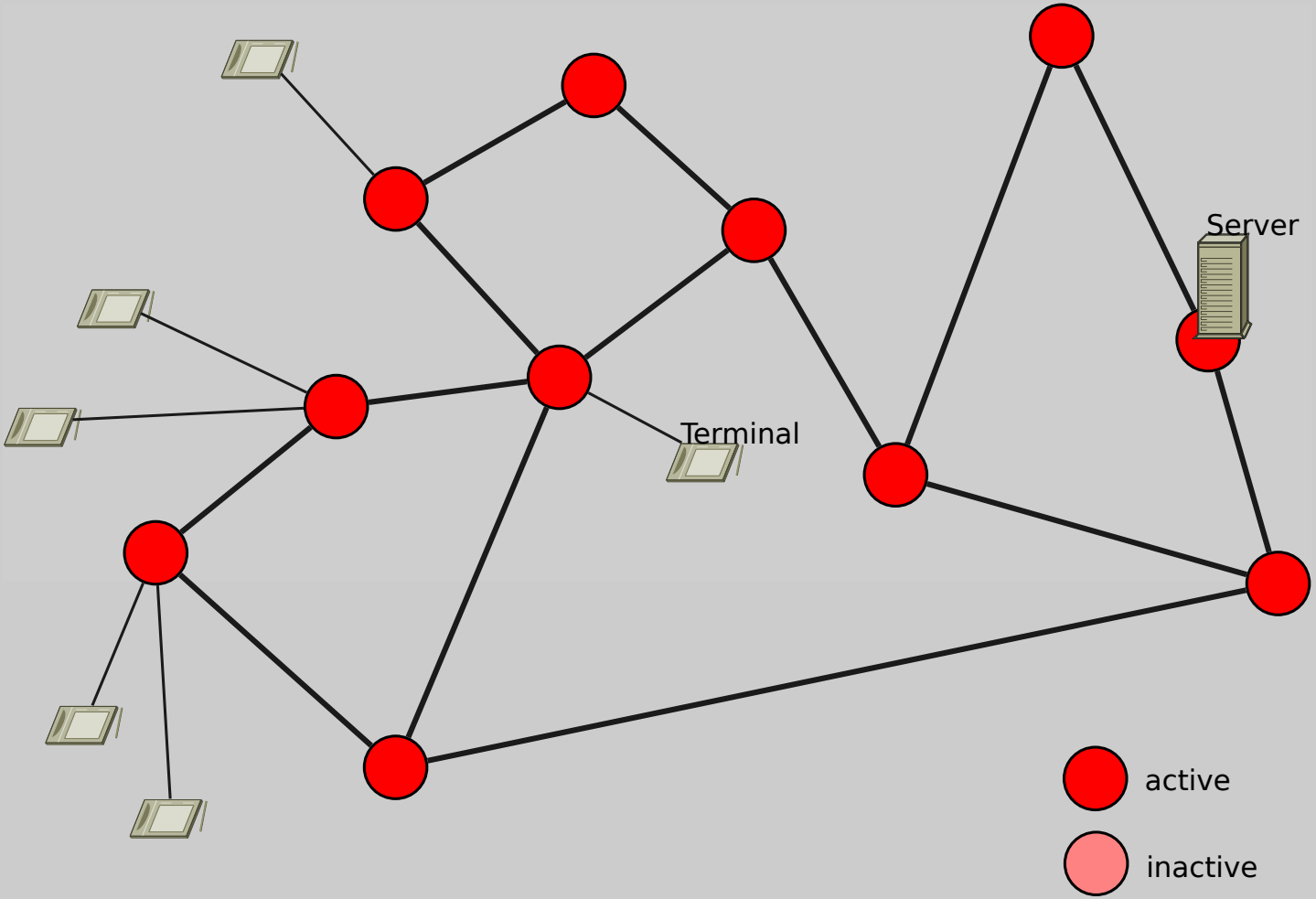


CloudNet Management

- Framework
- Resource Mapping
- **Migration Mgmt.**
- **Resource Description**
- **Prototype**



Online Migration Algorithm



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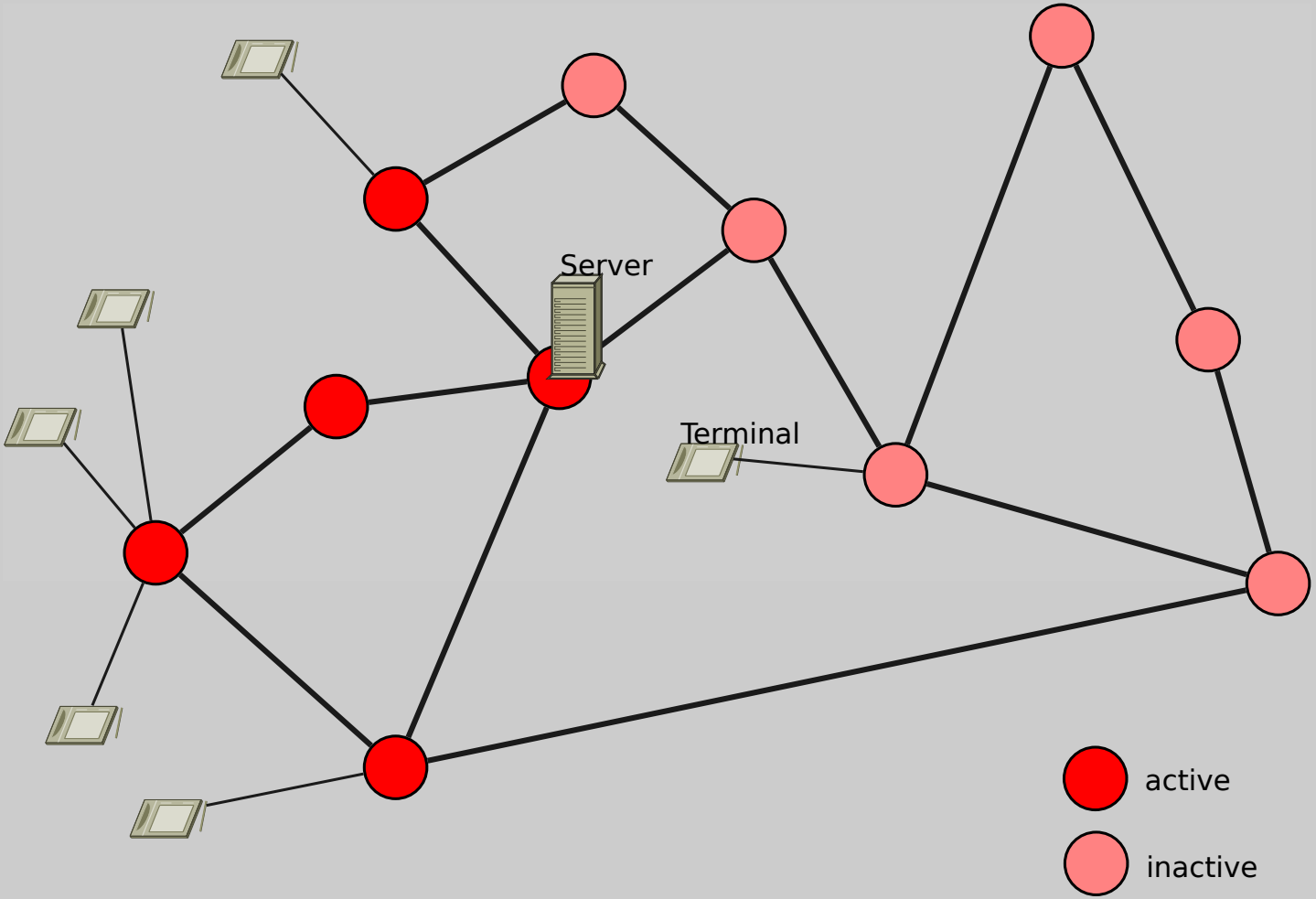

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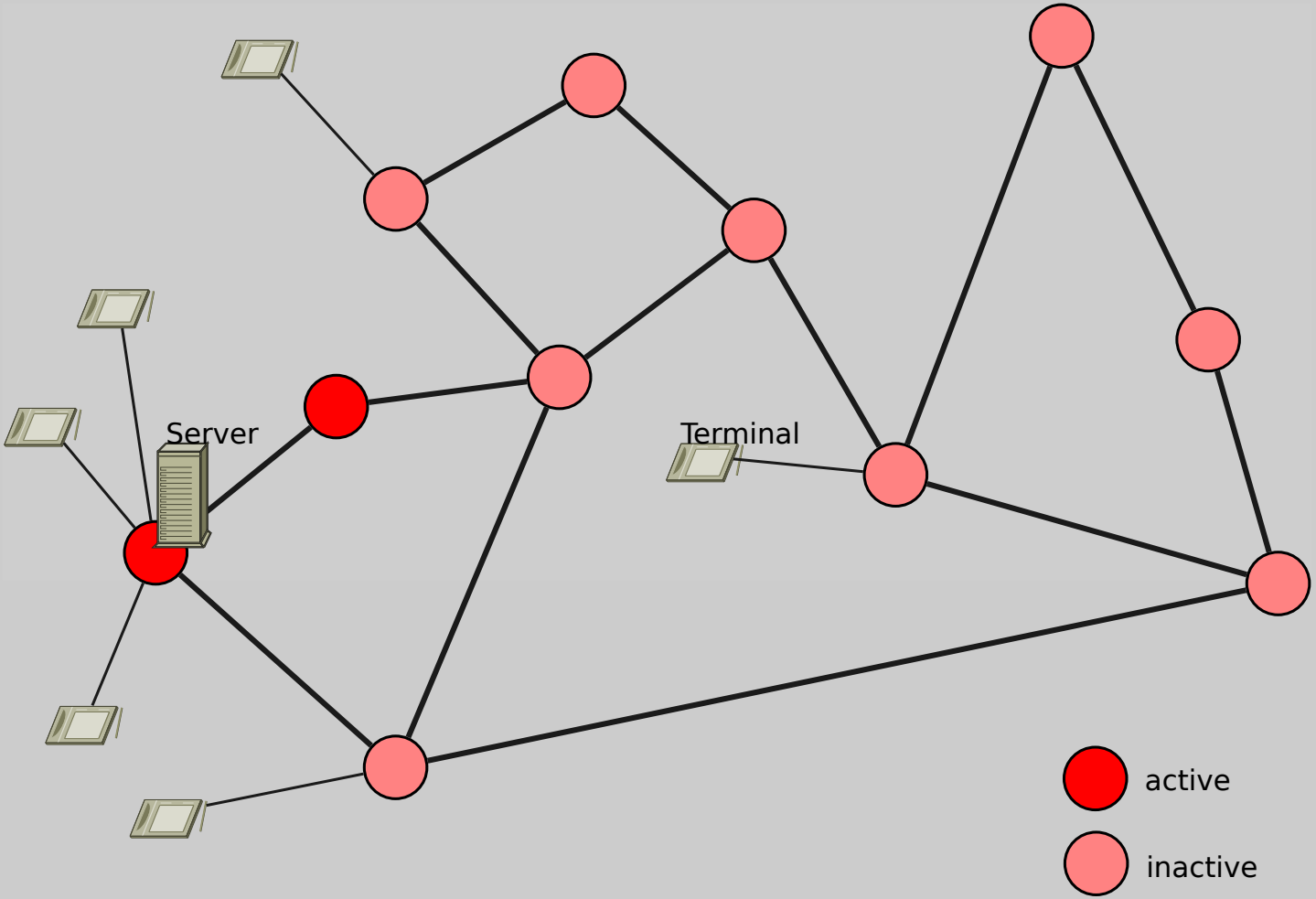
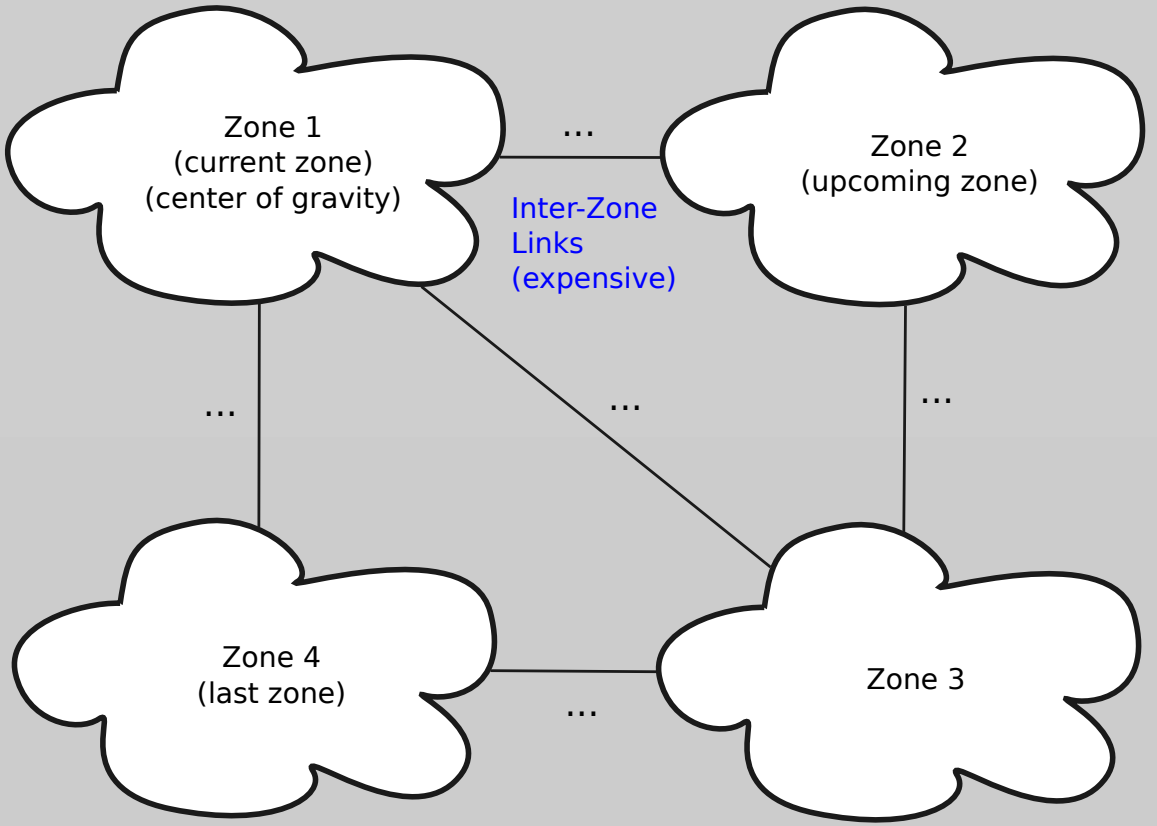


Simulation (Time of day scenario)



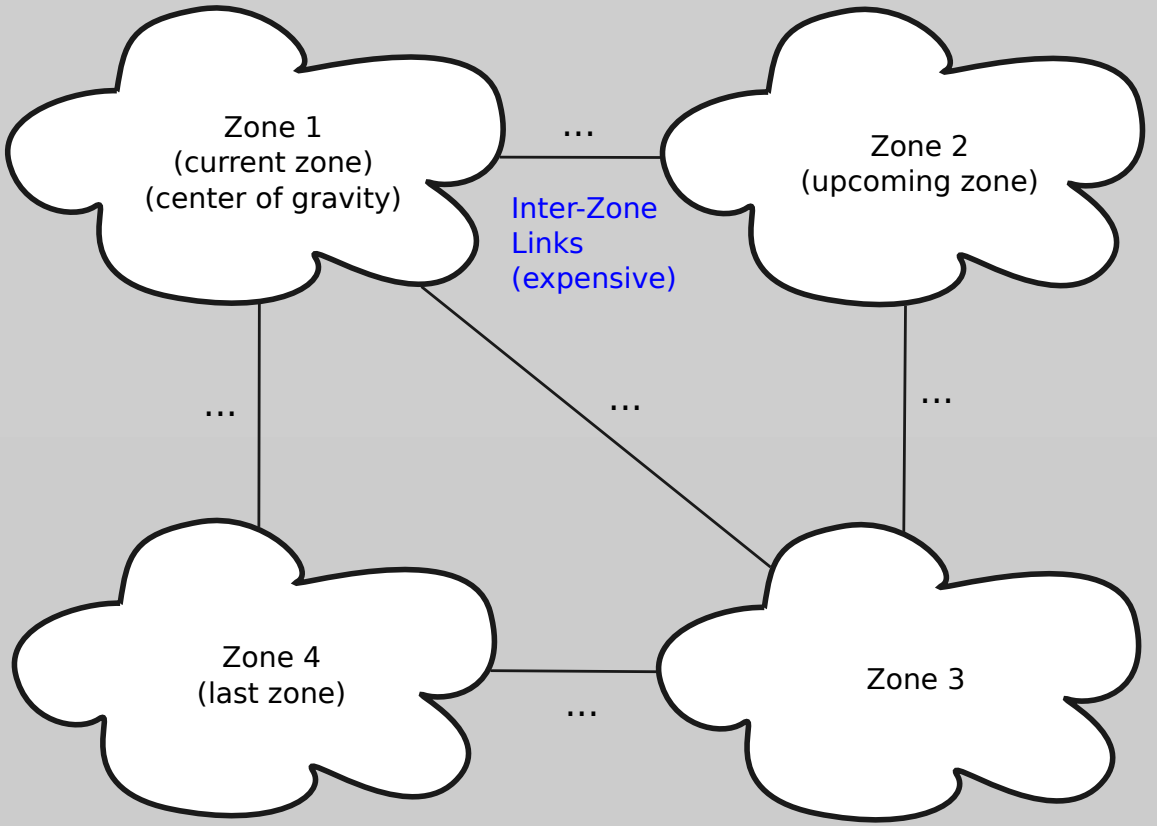
Parameters

- #Nodes
- Correlation (P)
- Sojourn time (λ)

Algorithms

- CEN, MIX O(log(n))
- TIMM, STAT
- OPT (ratio)

Simulation (Time of day scenario)



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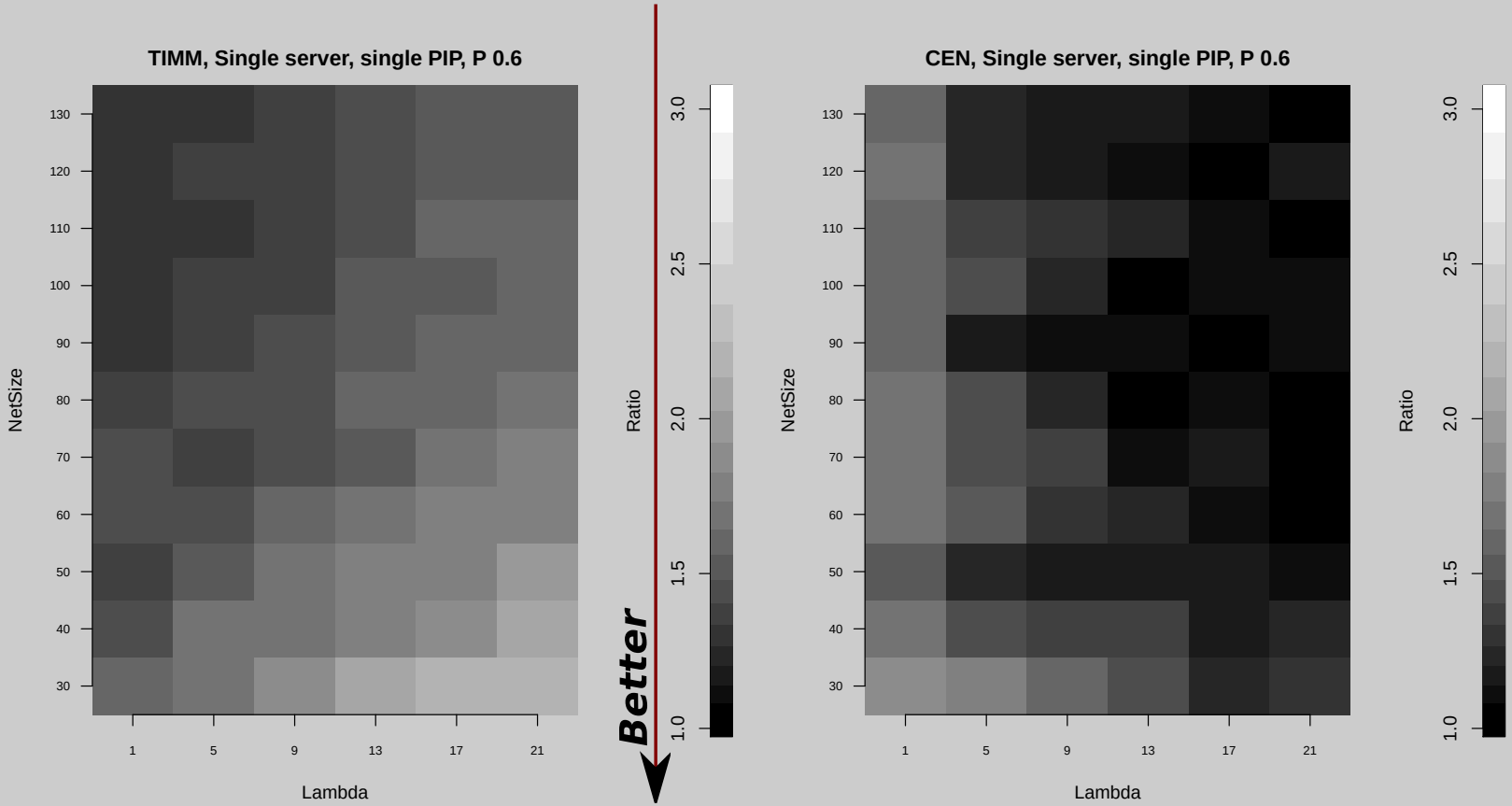

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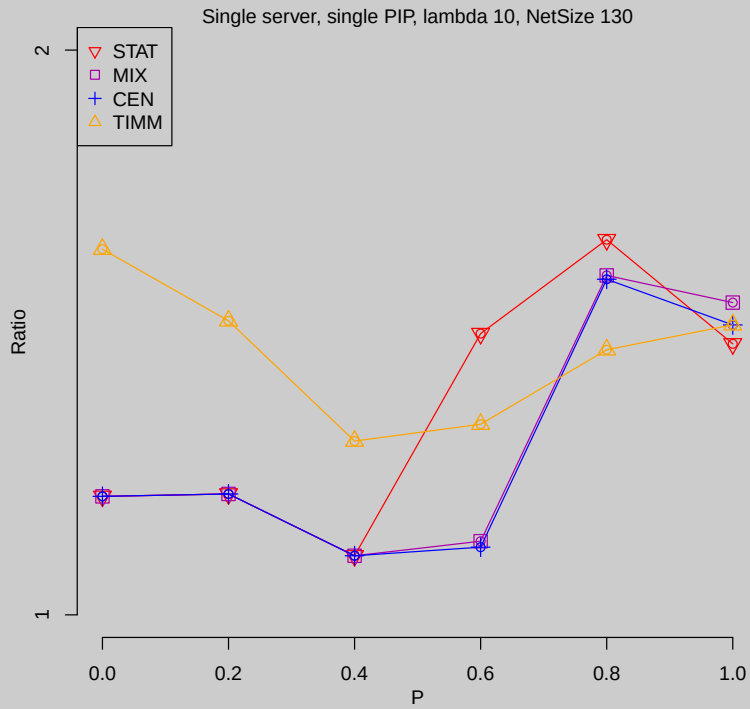

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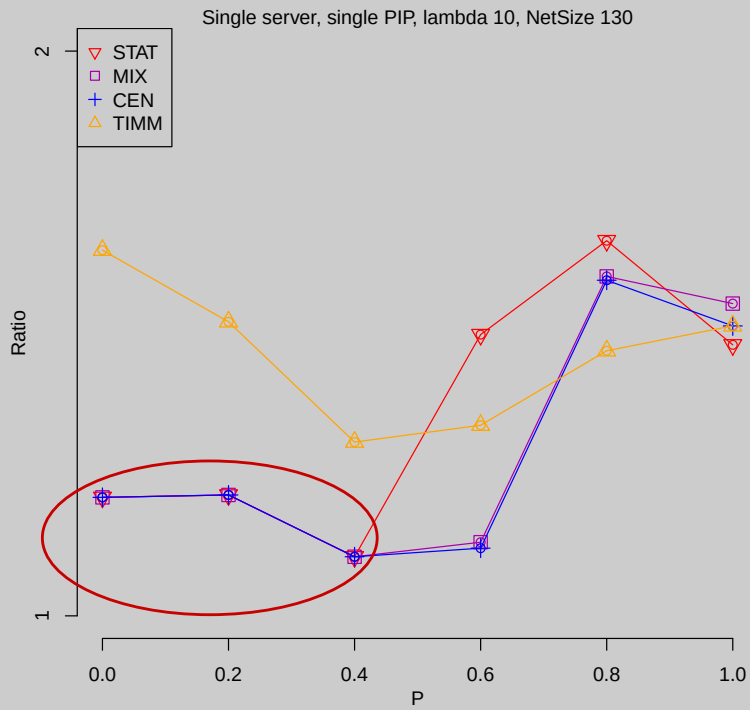

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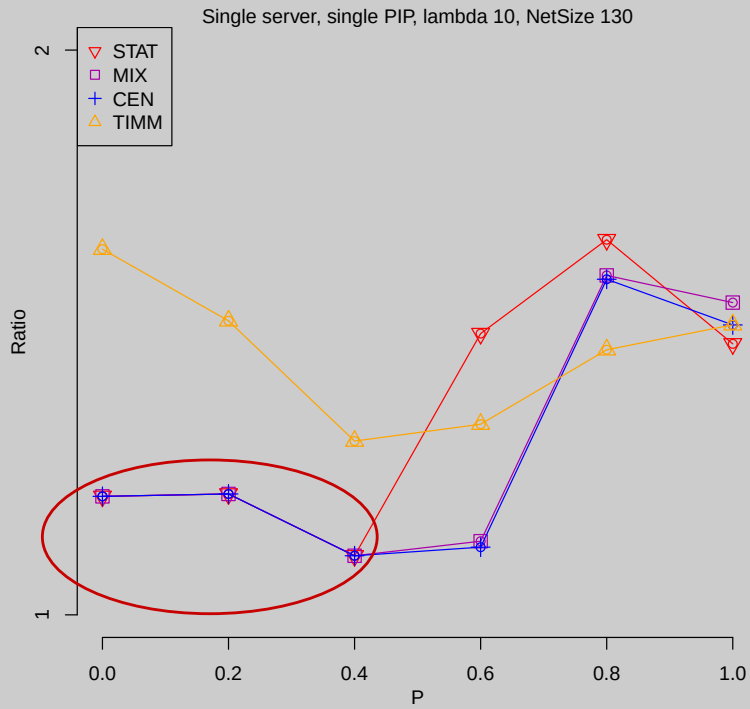
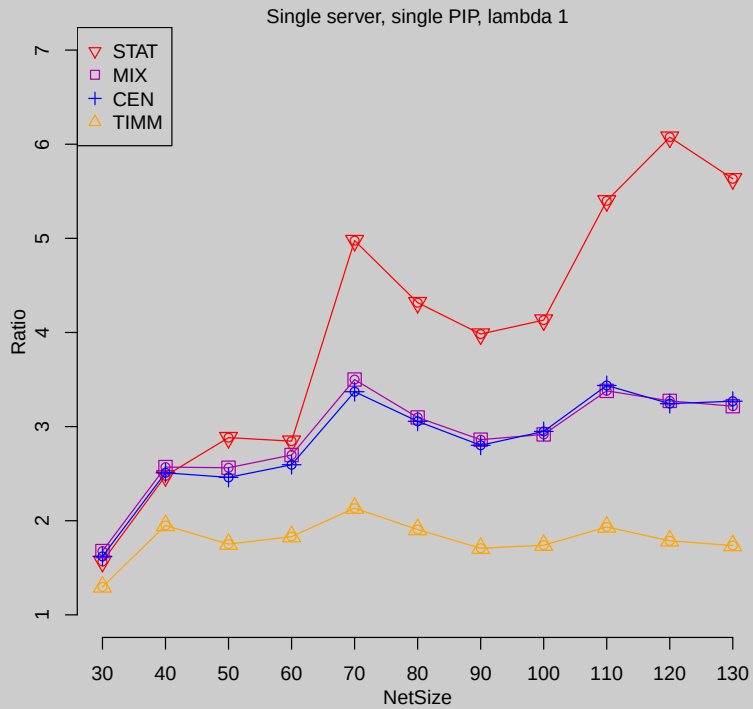
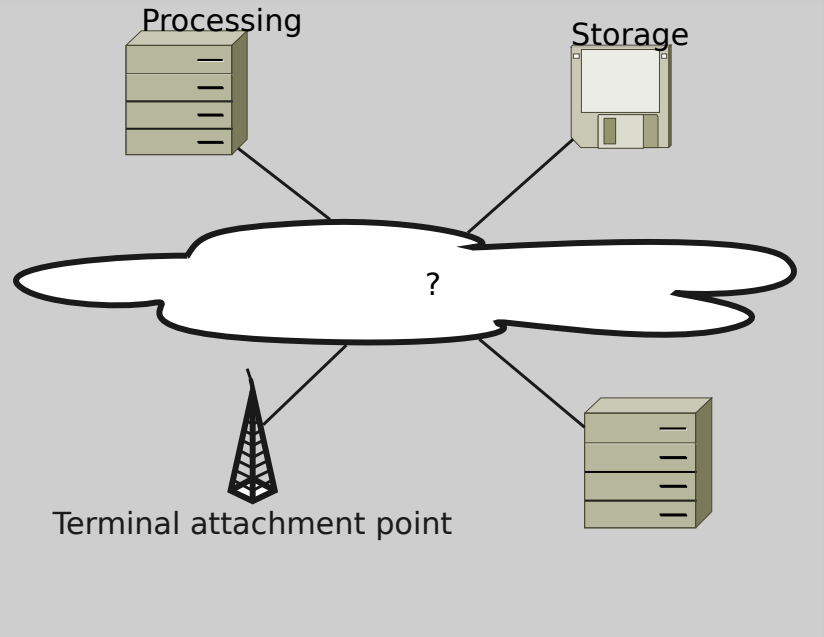




Resource Description Language

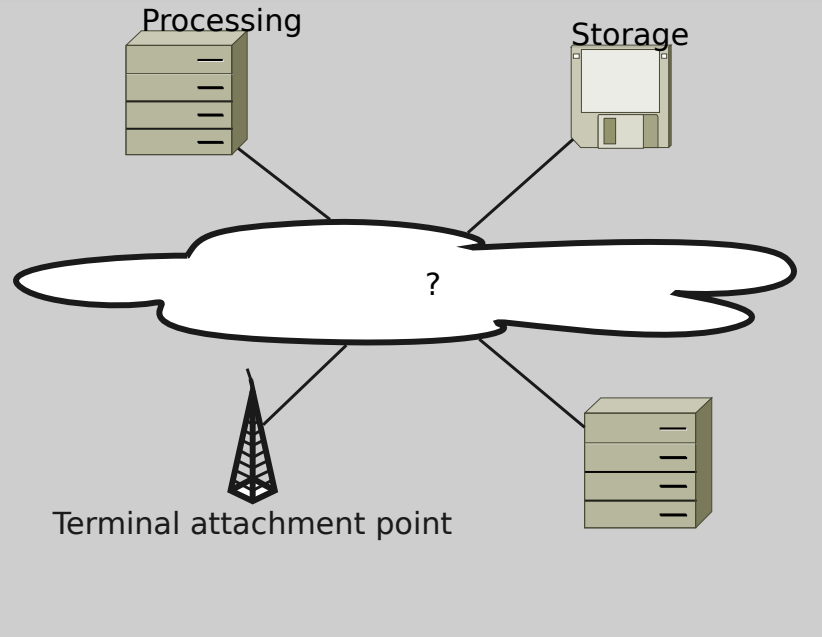
Complex, real world topologies...



- Need RDL to communicate requirements

Resource Description Language

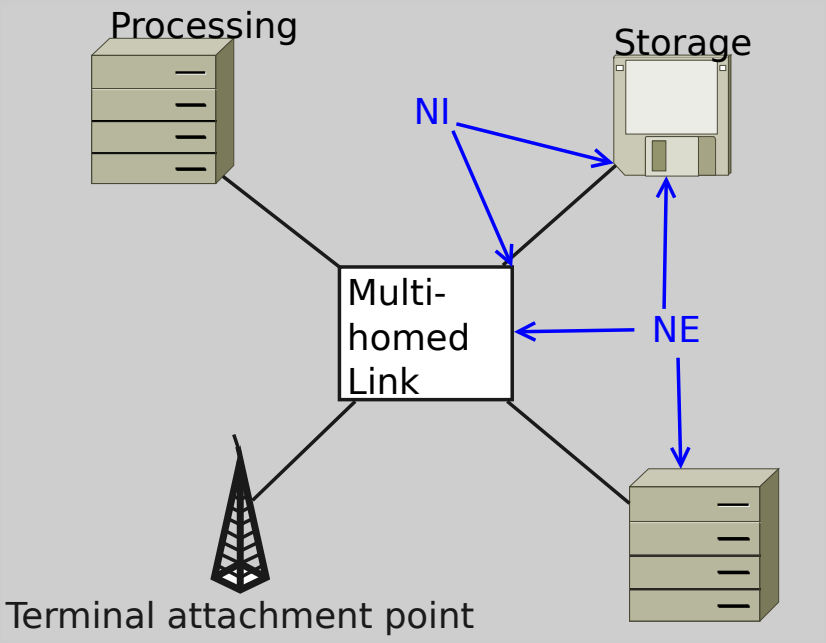
Support for mapping approaches...



- Need RDL to communicate requirements
- Ontology (automated reasoning)
- Graph structure (graph algorithms)

Resource Description Language

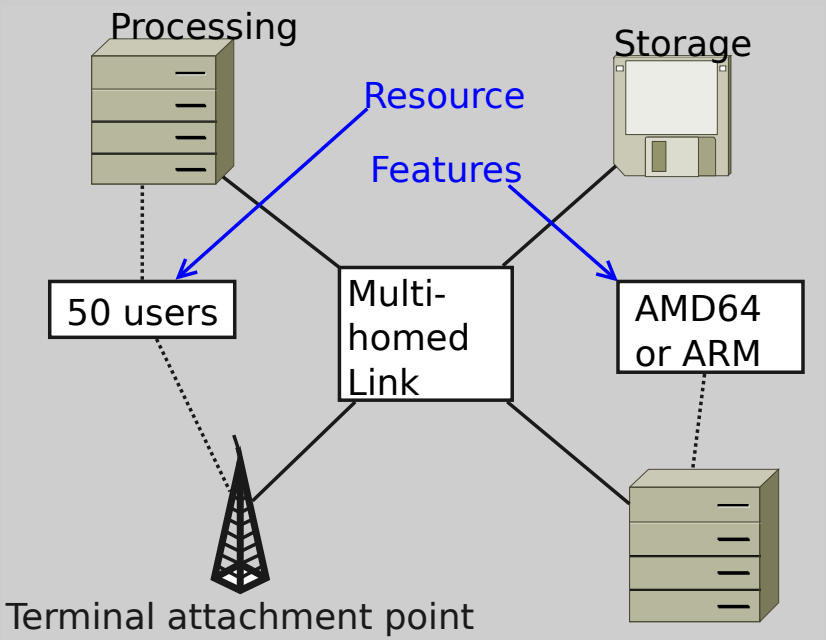
Topology as graphs...



- Real world networks

Resource Description Language

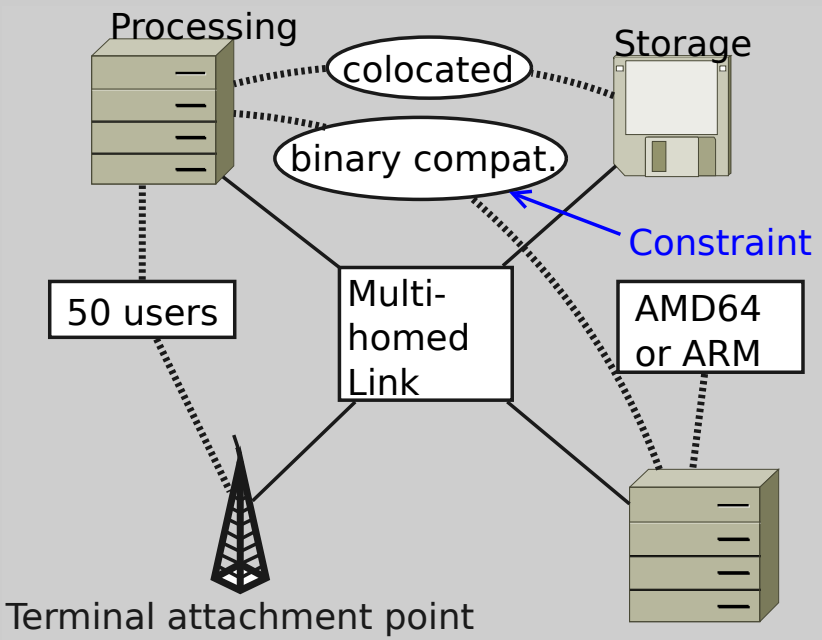
Service levels and interests...



- Real world networks
- Vagueness/Omissions
- Different service levels

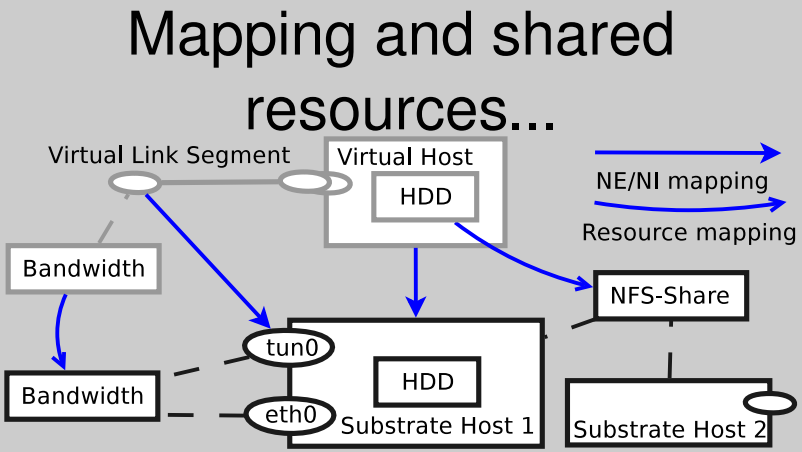
Resource Description Language

Correlating elements...



- Real world networks
- Vagueness/Omissions
- Different service levels
- Non-topological constraints

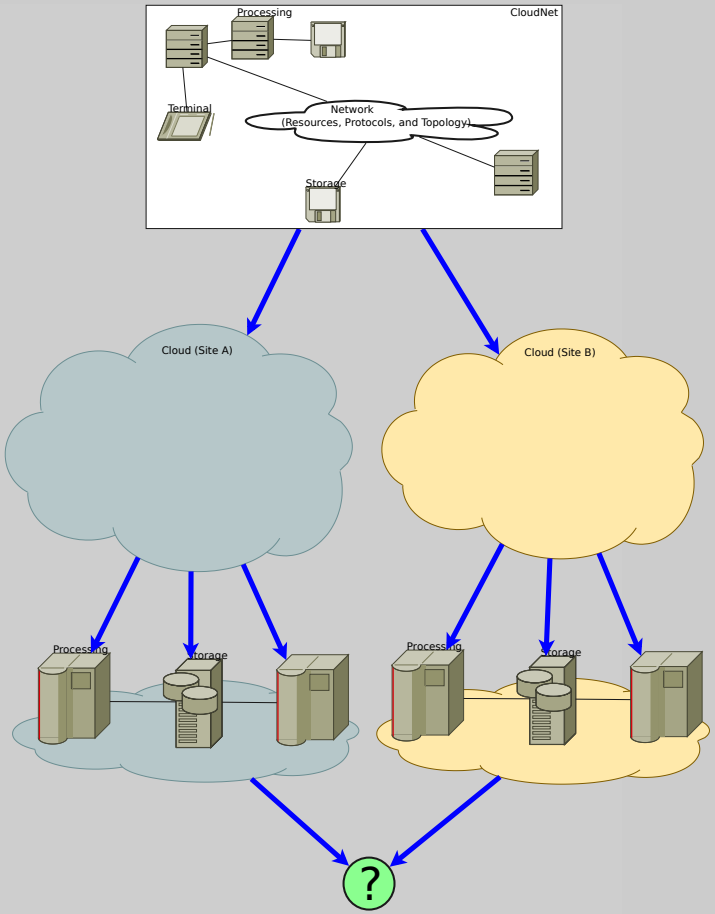
Resource Description Language



- Real world networks
- Vagueness/Omissions
- Different service levels
- Non-topological constraints
- Mapping

Resource Description Language

Partial Mappings...

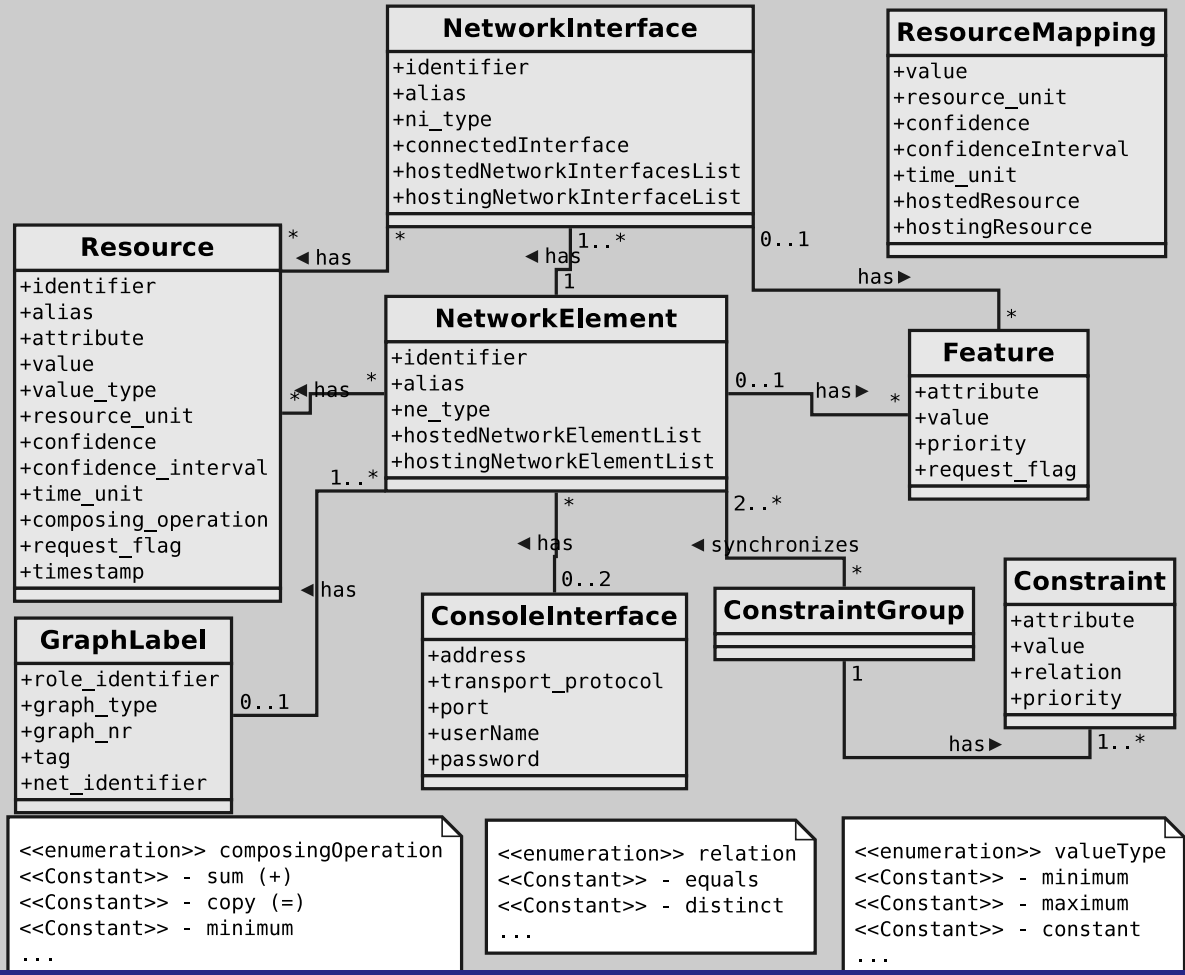


Recursive virtualization...

- Real world networks
- Vagueness/Omissions
- Different service levels
- Non-topological constraints
- Mapping
- Layering

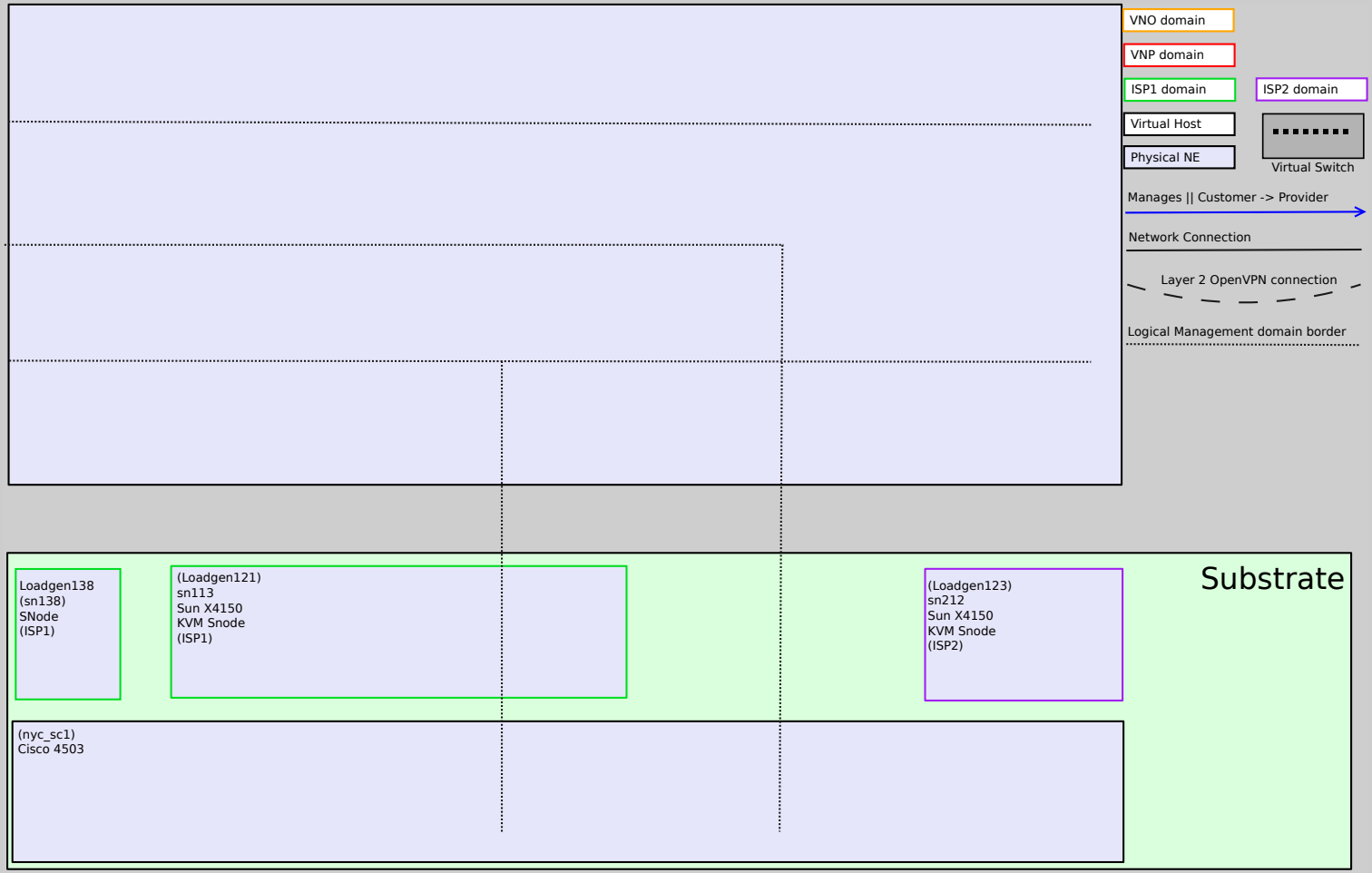
Resource Description Language

Used in the prototype and testbed...



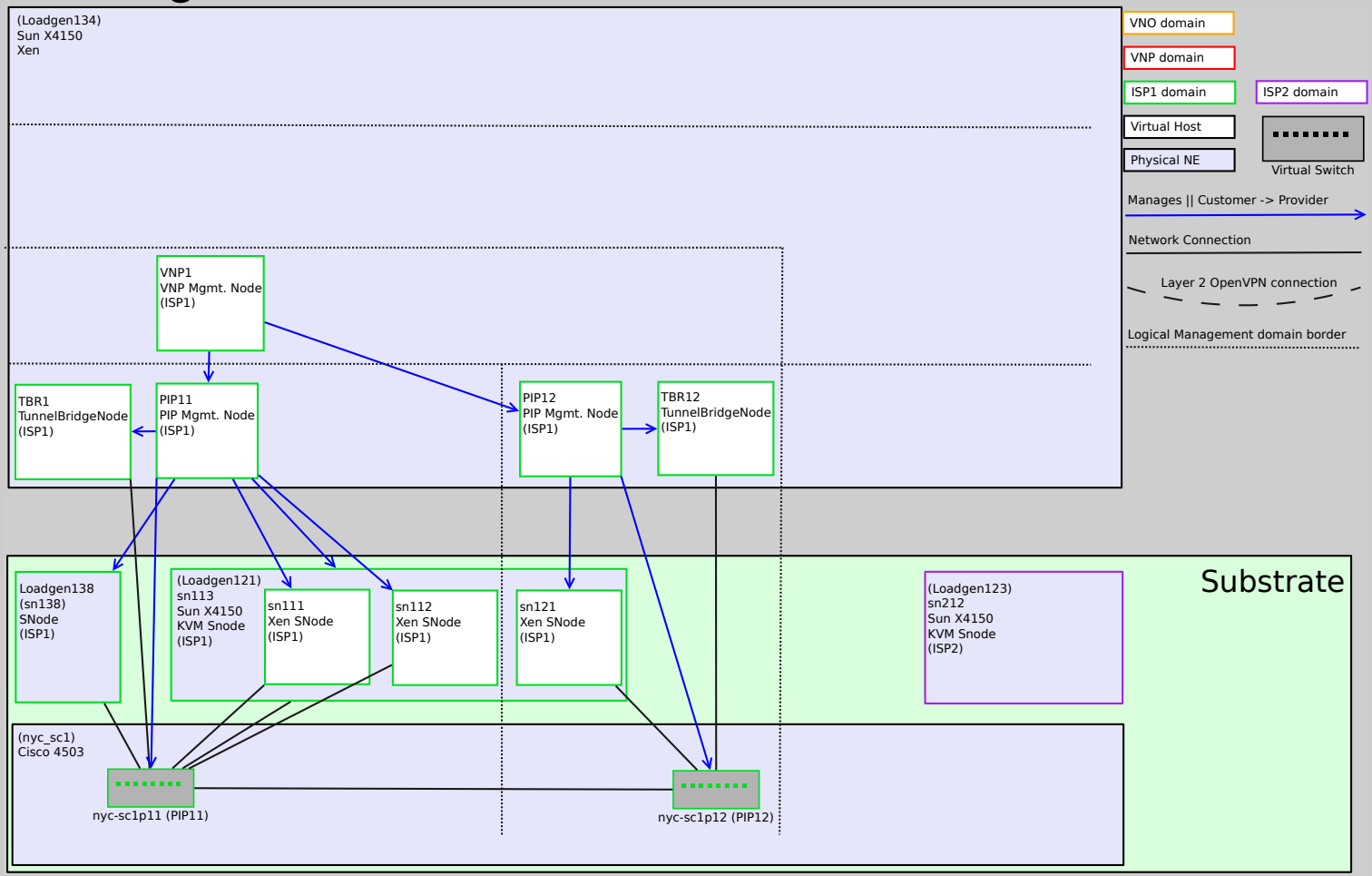
Testbed

Multiple Sites



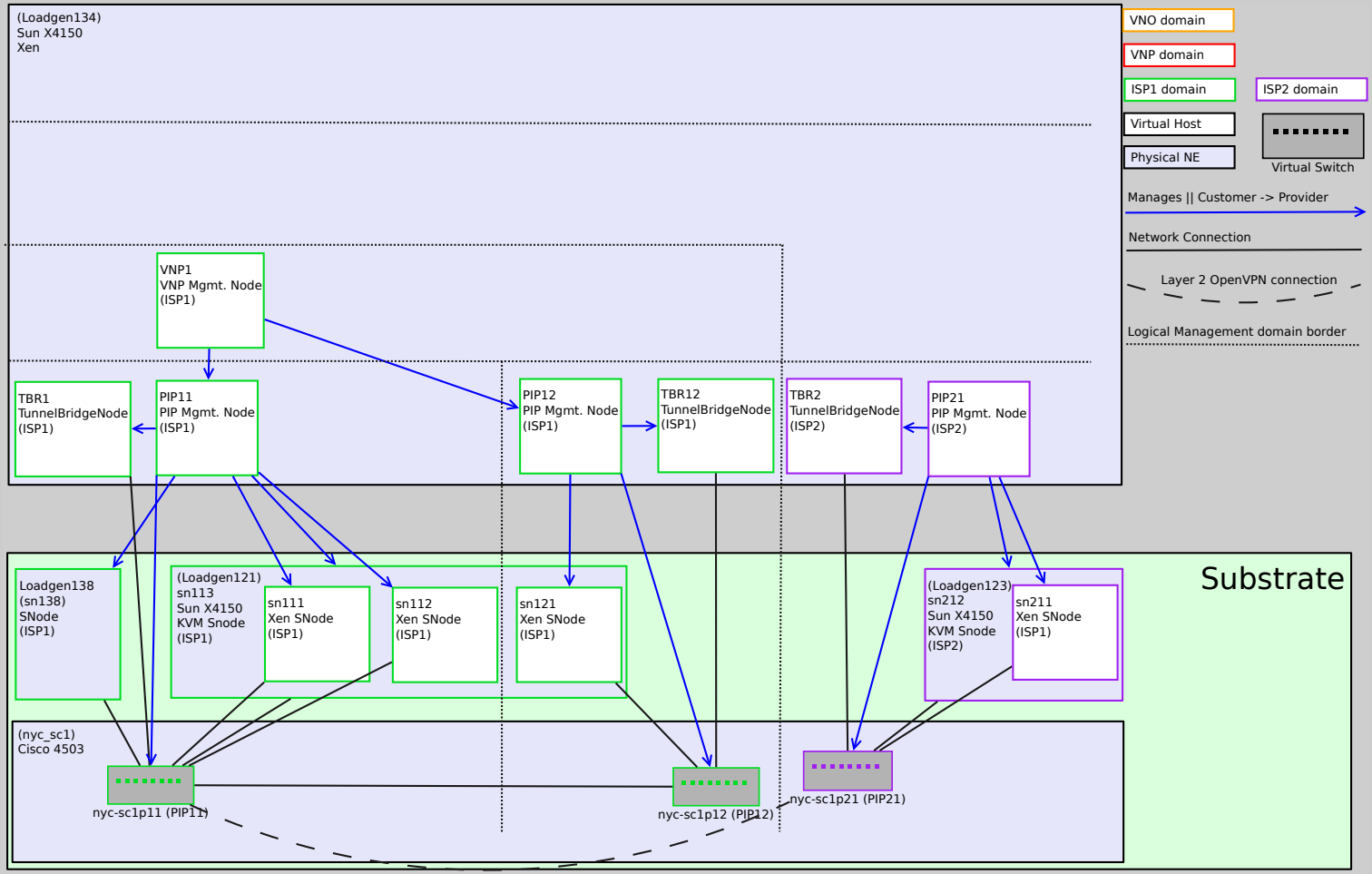
Testbed

Substructuring



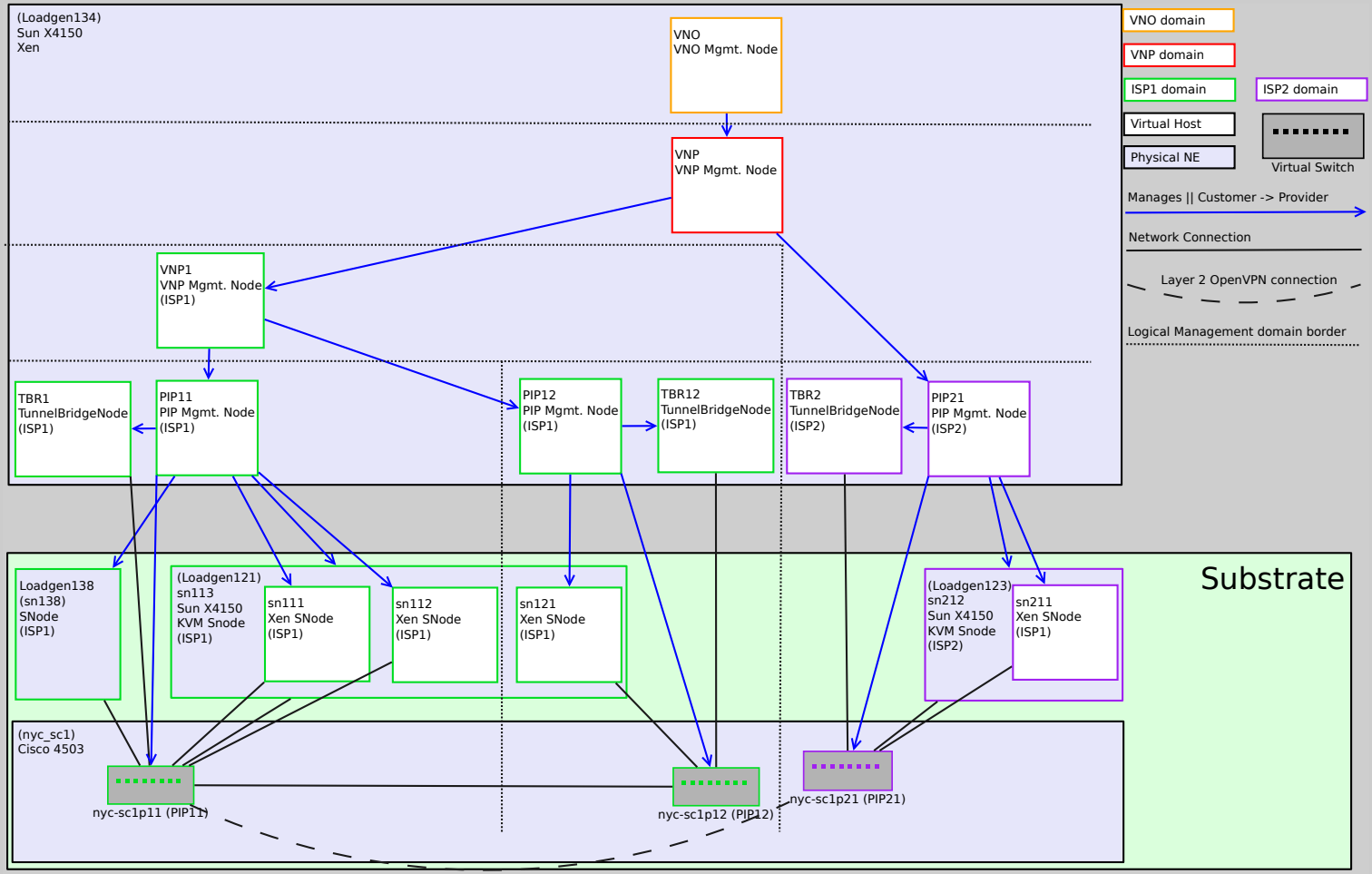
Testbed

Multiple Administrative Zones

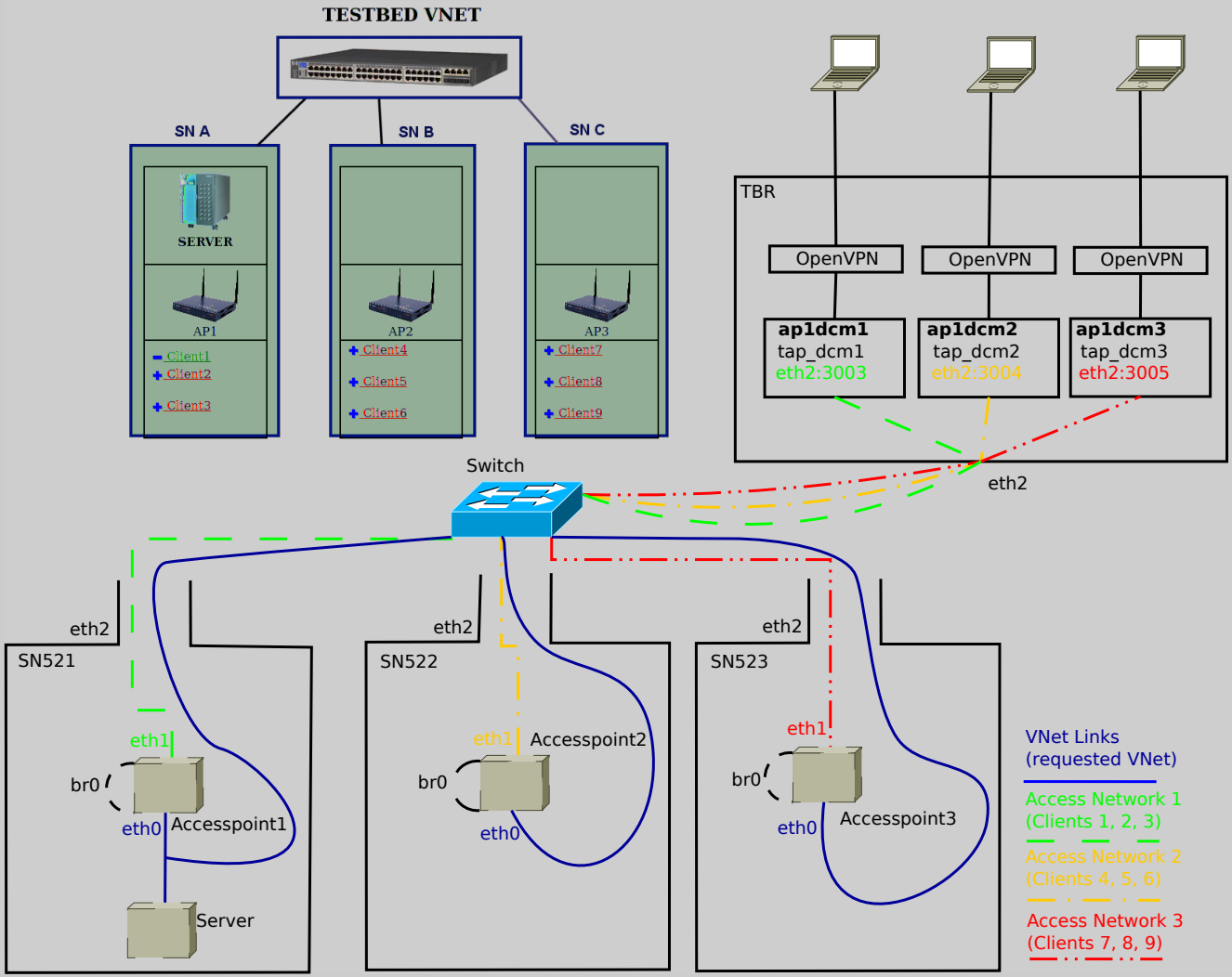


Testbed

Sister-Testbed



Demonstrator (CloudNet-Substrate-Interactions)



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Discussion

Thank you for your attention.

Questions?

- G. Schaffrath, St. Schmid, I. Vaishnavi, A. Khan, A. Feldmann: *A Resource Description Language with Vagueness Support for Multi-Provider Cloud Networks* ; International Conference on Computer Communication Networks (ICCCN) ; IEEE ; 2012
- G.Even, M. Medina, G. Schaffrath, St. Schmid: *Competitive and Deterministic Embeddings of Virtual Networks* ; Proceedings of 13th International Conference on Distributed Computing and Networking (ICDCN '12) ; 2012 (Best Paper Award)
- A. Feldmann, G. Schaffrath, St. Schmid: *CloudNets: Combining Clouds with Networking* ; ERCIM News, 56-57 ; 2012
- D. Arora, A. Feldmann, G. Schaffrath, St. Schmid: *On the Benefit of Virtualization: Strategies for Flexible Server Allocation* ; Proceedings of USENIX Workshop on Hot Topics in Management of Internet, Cloud, and Enterprise Networks and Services (Hot-ICE '11). Usenix, 1-6. ; 2011
- D. Arora, M. Bienkowski, A. Feldmann, G. Schaffrath, St. Schmid: *Online Strategies for Intra and Inter Provider Service Migration in Virtual Networks* ; Proceedings of Principles, Systems and Applications of IP Telecommunications (IPTComm '11). ACM, 1-11. ; 2011